

CLAIMS

What is claimed is:

1. A method of forming at least one electrically conductive trace on a substrate comprising:
providing a substrate having at least one face and having a dielectric structure of a preselected configuration formed on the at least one face of the substrate, the dielectric structure having at least one first surface vertically distanced from the substrate;
providing a print screen having a first side and a second side and positioning the second side of the print screen opposite the at least one first surface of the dielectric structure of the substrate;
providing and biasing a squeegee of a preselected hardness against the first side of the print screen toward the substrate, thereby forming an angle between at least a portion of the second side of the print screen forward of the squeegee and the at least one first surface of the dielectric structure;
screen printing an electrically conductive substance onto the at least one face of the substrate located below the at least one first surface of the dielectric structure to form at least one electrically conductive trace;
screen printing the electrically conductive substance onto at least a portion of the at least one first surface of the dielectric structure so as to further form and extend the at least one electrically conductive trace from the substrate to the at least one first surface of the dielectric structure;
limiting the angle formed between the at least a portion of the second side of the print screen and the at least one first surface of the dielectric structure to an angle not exceeding approximately 15° while screen printing the at least one first surface of the dielectric structure; and
firing the substrate.

2. The method of claim 1, wherein firing the substrate includes firing the substrate upon forming the at least one electrically conductive trace in its entirety.

3. The method of claim 1, wherein the at least one electrically conductive trace is formed on the dielectric structure subsequent to the at least one electrically conductive trace being formed on the substrate.

4. The method of claim 1, wherein the electrically conductive substance has a viscosity within a range of approximately 50,000 to 600,000 centipoise and further comprises gold.

5. The method of claim 3, wherein the print screen comprises stainless steel or monofilament polymer fiber and wherein the print screen has a mesh within a range of approximately 80 to approximately 500 and a nominal thickness not exceeding approximately 0.8 mils (0.0008 inches/0.0020 cm).

6. The method of claim 5, wherein the squeegee has a durometer value within a range of approximately 50 to 70.

7. The method of claim 1, wherein the angle formed between the at least a portion of the second side of the print screen and the at least one first surface of the dielectric structure is limited to within a range of approximately 5° to approximately 10°.

8. The method of claim 1, wherein the substrate comprises at least one of the group comprising glass and ceramic and wherein the vertical distance of the at least one first surface of the dielectric structure from the at least one face of the substrate does not exceed approximately 10 mils (0.010 inches/0.025 cm).

9. The method of claim 8, wherein the dielectric structure comprises a generally rectangular cross-section comprising at least one generally planar side surface extending generally perpendicular to the at least one face of the substrate and the at least one first surface of the dielectric structure is generally rectangular in shape.

10. The method of claim 9, wherein the dielectric structure comprises at least two vertically stacked layers of dielectric material.

11. The method of claim 9, wherein the at least one first surface of the dielectric structure has a width less than approximately 10 mils (0.010 inches/0.025 cm) and the vertical distance of the at least one first surface from the substrate does not exceed approximately 7 mils (0.007 inches/0.018 cm).

12. The method of claim 9, wherein the at least one electrically conductive trace comprises a plurality of electrically conductive traces arranged in a generally parallel spaced relationship of a preselected pitch.

13. The method of claim 12, wherein the preselected pitch comprises a distance not exceeding approximately 50 mils (0.050 inches/0.127 cm).

14. The method of claim 13, wherein the preselected pitch comprises a distance of approximately 20 mils (0.020 inches/0.051 cm).

15. The method of claim 9, wherein the at least one electrically conductive trace has a nominal depth not exceeding approximately 1 mil (0.001 inches/0.0025 cm).

16. The method of claim 2, wherein the at least one electrically conductive trace has a nominal depth when wet not exceeding approximately 0.7 mil (0.0007 inches/0.0018 cm) and a nominal depth upon being fired not exceeding approximately 0.5 mil (0.0005 inches/0.0013 cm).

17. The method of claim 16, wherein the at least one electrically conductive trace comprises a plurality of electrically conductive traces arranged in a generally parallel spaced relationship having a preselected pitch not exceeding approximately 50 mils (0.050 inches/0.127 cm).

18. The method of claim 17, further comprising at least one of the plurality of electrically conductive traces formed and extending from the at least one face of the substrate onto the dielectric structure being formed to terminate into a generally rectangularly shaped contact pad located on the at least one first surface of the dielectric structure.

19. The method of claim 18, wherein the plurality of electrically conductive traces includes oppositely positioned end-most located electrically conductive traces, each end-most located electrically conductive trace being formed to respectively terminate into the generally rectangularly shaped contact pads located on the dielectric structure and comprising tabular-shaped extensions extending laterally outwardly from the respective generally rectangularly shaped contact pads.

20. The method of claim 19, wherein the substrate comprises at least one anode plate of a field emission display device.

21. The method of claim 20, wherein the substrate comprises a plurality of anode plates arranged in an array.

22. The method of claim 19, wherein each of the plurality of electrically conductive traces comprises an uphill region intermediate the at least one face of the substrate and the dielectric structure and wherein the uphill region is contiguous with at least a portion of a generally vertically extending sidewall of the dielectric structure.

23. The method of claim 1, further comprising maintaining a snap-off distance generally not exceeding approximately 0.2 mil (0.0002 inches/0.0005 cm) between the second side of the print screen and at least a portion of the at least one face of the substrate when screen printing the electrically conductive substance onto the at least a portion of the at least one face of the substrate located below the at least one first surface of the dielectric structure to form the at least one electrically conductive trace.

24. The method of claim 23, wherein the snap-off distance is maintained within a range of approximately 0.1 mils (0.0001 inches/0.0003 cm) to approximately 0.125 mils (0.000125 inches /0.000317 cm).

25. The method of claim 1, wherein limiting the angle formed between the at least a portion of the second side of the print screen and the at least one first surface of the dielectric structure comprises being limited to a range of approximately 5°.